What is claimed:

15

- 1. An antenna array comprising a fractile array having a plurality of antenna elements uniformly distributed along a Peano-Gosper curve.
- 2. An antenna array comprising an array having an irregular boundary contour wherein the irregular boundary contour comprises a plane tiled by a plurality of fractiles, said plurality of fractiles covers the plane without any gaps or overlaps.
 - 3. A method for generating an antenna array having improved broadband performance, comprising the steps of:
- tiling a plane with a plurality of non-uniform shaped unit cells of an antenna array;

optimizing the non-uniform shape of the unit cells; and optimizing the tiling of said unit cells.

- 4. The method of claim 3, wherein the optimizing further comprises at least one of a genetic algorithm or a particle swarm optimization.
- 5. A method for rapid radiation pattern formation of a fractile array, comprising the steps of:
- a) employing a pattern multiplication for fractile arrays, comprising:
 deriving a product formulation for the radiation pattern of a fractile array
 for a desired stage of growth;
 - b) recursively applying step (a) to construct higher order fractile arrays; and
 - c) forming an antenna array based on the results of step (b).
 - 6. A method for rapid radiation pattern formation of a Peano-Gosper fractile array, comprising the steps of:

- a) employing a pattern multiplication for fractile arrays, comprising:

 deriving a product formulation for the radiation pattern of a fractile array

 for a desired stage of growth;
- b) recursively applying step (a) to construct higher order fractile arrays; and
- 5 c) forming an antenna array based on the results of step (b).